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your community energy company

November 12, 2021

Via Electronic Regulatory Filing

Ms. Steffany Powell Coker
Secretary to the Commission
Public Service Commission of Wisconsin
PO Box 7854
Madison WI 53707-7854

Subject: MGE's Response to SEA Supplemental Data Request Dated September 7, 2021 - Docket 5-ES-111

Dear Ms. Powell Coker:

In response to your letter dated September 7, 2021 (PSC REF#: 420196), Madison Gas and Electric Company submits the attached public response to the Strategic Energy Assessment supplemental data request.

If you require any additional information, please contact me at 252-5625 or mwisersky@mge.com.

Sincerely,

Megan M. Wisersky
Electric Planning Manager

bjb

Attachment

Docket 5-ES-111
Strategic Energy Assessment (SEA 2028)
SEA for 2022 through 2028
Supplemental Data Request
November 12, 2021

Question 1:

A description of any carbon reduction goals established for the provider, which specifies:

- **The baseline year used for establishing the goal and the year (or years) in which certain reduction goals are to be reached; and**
- **The magnitude of the reduction goal expressed as both a percentage and in million metric tons of CO_2 ($MMTCO_2$).**

Response

In 2019, MGE was one of the first utilities in the nation to commit to a goal of net-zero carbon electricity by mid-century. MGE established its goal consistent with global climate science. It followed the carbon reduction goals that MGE set in November 2015 in its Energy 2030 framework, under which MGE pledged to reduce carbon at least 40% by 2030 from 2005 levels. To date, MGE has reduced its carbon emissions 30% since 2005, and MGE now expects to achieve carbon emissions reductions of at least 65% by 2030.

In 2005, the baseline carbon dioxide (CO_2) emissions level for the MGE system was approximately 3.6 million tons. CO_2 emissions are calculated from generating units owned by MGE, power purchase agreements, and power purchased by MGE on the regional Midcontinent Independent System Operator (MISO) market. The market purchase emission rate is based on a historical seven-state regional average CO_2 emission profile from all power produced in Wisconsin and the surrounding Midwest states based on data reported by the DOE-EIA for the most recent available historical year.

Question 2:

Data specifying carbon emission levels on the provider's system in calendar year (CY) 2020, which permits clear analysis of progress to date towards any carbon reduction goals, in both percentage and $MMTCO_2$ terms. The system-wide CY 2020 data should be consistent with the facility-level data on 2020 CO_2 emissions provided in Schedule 8A, and the response to this supplementary data request should clearly explain how the system-wide totals can be reconciled with the facility-level data.

Response:

MGE system CO_2 emissions in calendar year 2020 were approximately 2.5 million tons. This represents an approximate 30% reduction from 2005 levels.

CO_2 emissions are calculated from generating units owned by MGE, power purchase agreements, and power purchased by MGE on the regional MISO market. The market purchase emission rate is based on

a historical seven-state regional average CO_2 emission profile from all power produced in Wisconsin and the surrounding Midwest states.

The current calculated historical seven-state regional average CO_2 emission rate is based on 2019 historical state energy profile data as published by the DOE-EIA. As new information becomes available from the DOE-EIA each year, MGE updates the historical seven-state regional average CO_2 emission rate with the latest information available.

Question 3:

Projected carbon emission levels on the providers system in CY 2022, CY 2024, CY 2026, and CY 2028, which specifies projected progress towards any carbon reduction goals in both percentage in MMTCO_2 terms.

Response:

MGE has developed two different methods for estimating future carbon emission levels on the MGE system. Method 1 uses the most recent historical seven-state average CO_2 emissions rate from all power produced in Wisconsin and the surrounding Midwest states as a proxy for estimating future emissions associated with power that is purchased from the MISO market. Method 2 assumes that the CO_2 emission rate associated with power that is purchased from the MISO market continues a steady decline toward a level that is 80% below 2005 historical levels by the year 2030. This is to reflect the goals set by many market participants to reduce future carbon emissions by 2030.

Using Method 1, projected carbon emission levels on MGE's system are as follows for the years requested:

Year	CO_2 Tons (in M Tons)	Percent Reduction as Compared to 2005 Levels
CY 2022	2.34 M Tons	35%
CY 2024	1.65 M Tons	54%
CY 2026	1.30 M Tons	64%
CY 2028	1.29 M Tons	64%

As described previously, using Method 1, CO_2 emissions are calculated from generating units owned by MGE, power purchase agreements, and power purchased by MGE on the regional MISO market. The market purchase emission rate is based on a historical seven-state regional average CO_2 emission profile from all power produced in Wisconsin and the surrounding Midwest states.

The current calculated historical seven-state regional average CO_2 emission rate is based on 2019 historical state energy profile data as published by the DOE-EIA. As new information becomes available from the DOE-EIA each year, MGE updates the historical seven-state regional average CO_2 emission rate with the latest information available.

For purposes of estimating CO_2 emissions from purchased power for future years, MGE uses the most recently available historical seven-state average CO_2 emission rate based on DOE-EIA historical data as opposed to attempting to forecast a CO_2 emission rate for the seven-state region for future years.

Using Method 2, projected carbon emission levels on MGE's system are as follows for the years requested:

Year	CO_2 Tons (in M Tons)	Percent Reduction as Compared to 2005 Levels
CY 2022	2.33 M Tons	35%
CY 2024	1.63 M Tons	55%
CY 2026	1.02 M Tons	72%
CY 2028	1.01 M Tons	72%

As described earlier, using Method 2, CO_2 emissions are calculated from generating units owned by MGE, power purchase agreements, and power purchased by MGE on the regional MISO market. The market purchase CO_2 emission rate under Method 2 assumes a continued linear downward trend in the market CO_2 emission rate so that by 2030, the rate is 80% below 2005 levels. This is intended to reflect the continued reduction in CO_2 emissions associated with power purchased in the MISO market as participants throughout MISO continue progress toward their announced carbon reduction goals.

For Method 2, MGE has also attempted to account for the recent WEC announcement for the Elm Road Generating Station (ERGS) on November 5, 2021, in which WEC announced plans to blend 60% natural gas with coal at ERGS by 2025. Reducing coal burn at ERGS and blending natural gas instead will lead to further reductions in MGE's system CO_2 emissions as illustrated above.

Question 4:

A narrative explaining the anticipated causes behind projected changes in carbon emissions levels in each year for which data is provided. This narrative should address the relationship between changes in carbon emissions levels and the data submitted through the standardized SEA schedules regarding unit retirements, new generating facilities, purchases, energy efficiency, demand response, and DER. In specific, the narrative should explain in detail the impacts on projected emissions from generation additions and retirements, with reference to the 2020 facility emissions data provided in Schedule 8A.

Response:

MGE's long-term power supply plans include the planned retirement of the Columbia Energy Center Units 1 and 2 by year-end 2023 and 2024 respectively. New renewable energy resources are also planned to replace the capacity and energy formerly provided by MGE's 19% share of the Columbia Energy Center. These new renewable energy resources include MGE's 10% share of each of the following planned facilities: Paris Solar and BESS facility, Darien Solar and BESS facility, Red Barn Wind facility, and Koshkonong Solar and BESS facility. Other renewable energy resources recently added to MGE's power supply portfolio include the following distribution-connected facilities: Morey Airport Solar Renewable Energy Rider (RER) project, Dane County Solar RER project, O'Brien Solar RER project, and Hermsdorf Solar RER project. Recent transmission-connected projects added include Two Creeks Solar, Badger Hollow Solar Phase I, Badger Hollow Solar Phase II, and Saratoga Wind Farm.

Question 5:

All documents associated with Attachment Y-2 and Attachment Y filings submitted to or received from MISO in CY 2020 and CY 2021.

Response:

MGE did not submit any Attachment Y-2 or Attachment Y requests to MISO in CY 2020 and CY 2021.

Question 6:

All documents submitted to or received from MISO associated with Attachment Y-2 and Attachment Y filings regarding a retirement proposed to occur on a date within the SEA data collection period (CY 2019-CY 2028), to the extent those documents are not already identified through the first request.

Response:

MGE submitted an Attachment Y-2 request to MISO on November 6, 2018, to evaluate the potential retirement of Blount Units 6 and 7, effective January 1, 2024. MGE no longer plans to proceed with the retirement that was studied and, accordingly, has not provided these documents. They are no longer relevant. There were no other Attachment Y or Attachment Y-2 requests submitted by MGE that fall within the current SEA data request window.

Question 7:

A narrative description of the driving factors behind additions and retirements, including an explanation of the rationales for each retirement, and the role of new generation additions, as well as other considerations such as forecasted customer demand, in ensuring the utility meets future capacity and generation needs. This narrative should also explain the influence of utilities' carbon reduction goals on their decisions.

Response:

The driving factor behind electric generating unit retirements is carbon reduction which is fueled by customers' interest in reducing carbon emissions associated with electricity use. The age and condition of some older units are additional factors that also influence retirement dates for some older generating units. Customer interest in increasing use of and reliance on renewable energy resources and carbon reduction goals influences the type and timing of resource additions.

Specific dates for unit retirements and additions are also influenced by the need to coordinate with other joint plant owners of existing units (e.g., Columbia Energy Center) and the projected online dates for new renewable resources that are to be jointly owned (e.g., Paris, Darien, Red Barn, Koshkonong, etc.). These new renewable resources will be needed to provide the capacity and energy required to replace retiring resources so that customers' needs can continue to be met and electric system resource adequacy and reliability requirements can continue to be satisfied.

Question 8:

An explanation of the analysis procedures used by the utility to determine addition and retirement decisions, including the analytical models used, the rationale for selection of those models, and the methods used by the utility to ensure accurate and reliable modeling results.

Response:

As described in response to Question 7, unit retirement and addition decisions are highly influenced by customers' interest in and goals for reducing carbon emissions and increasing use of renewable energy resources. MGE uses the EGEAS utility planning model for evaluating alternative plans for meeting customers' future power supply needs while meeting resource adequacy and planning reserve margin requirements set by MISO and the PSCW. EGEAS is used as a software modeling tool to help guide, assist, and inform decisions related to the type and timing of future unit additions.

As part of its overall long-term planning process and procedures, MGE monitors and considers recent market activity, current trends in fuel supply and costs, MISO energy market prices, proposed carbon regulations, changes in tax credit policies, projections of future fuel and energy market prices supplied by expert consultants, and other important factors that are relevant to long-term electric generation expansion planning.

Question 9:

A description of the goals and standards used by the utility to set initial parameters for modeling, which may include but should not be limited to its definition of standards for maintaining system reliability, required reserve margins for resource adequacy, and the application of utility carbon reduction goals.

Response:

MGE monitors ongoing developments happening at MISO, ATC, and the PSCW related to goals and standards used for modeling and planning. MGE follows resource adequacy requirements and minimum planning reserve margin requirements that are set by MISO and the PSCW respectively.

Question 10:

Specification of the key input assumptions used to model system and market conditions, as well as any alternative assumptions used to conduct sensitivity analysis on the effects of different generation alternatives.

- **This specification shall include a detailed description of how the provider accounts for any existing renewable energy offerings, including but not limited to community solar and renewable energy riders.**

Response:

Key input assumptions are included and accounted for in MGE's long-term EGEAS expansion plan modeling. These key assumptions include, for example, electric demand and energy forecasts, fuel cost

forecasts, cost and operating characteristics of new and existing resources, financial parameters, and other assumptions. MGE also reflects in its long-term planning and modeling all existing and planned distributed RER projects, community solar projects, and other relevant renewable energy offerings as appropriate.

Question 11:

Specific description of all generation scenarios considered in analysis.

Response:

As part of MGE's long-term planning and modeling analysis, MGE performs both scenario analysis and sensitivity analysis. Scenarios considered in the analysis include a reference scenario, as well as other alternative scenarios that examine the impacts of a range of events that could unfold in the future. For example, scenarios evaluated by MGE typically involve changes in fuel cost forecast assumptions, changes in energy market price forecast assumptions, and changes in possible system carbon emission constraints.

In addition to scenario analysis, MGE also performs sensitivity analysis to help show the impacts of a change in a particular assumption to better understand how a decision could change if a particular key variable might change in the future. For example, sensitivity analyses evaluated by MGE typically involve changes in MISO's capacity accreditation rules, potential tax policy changes, project output performance (i.e., capacity factor), and availability of competing resource alternatives.

Question 12:

A presentation of modeling results that explains how the utility selected the proposed generation scenario reflected in its reported additions and retirements, and how the utility concluded this scenario was superior to other scenarios considered.

Response:

MGE considers a variety of factors when selecting resource additions and retirements that comprise a particular plan. Examples of the types of factors that MGE considers when selecting a preferred plan include compliance with energy priority laws, environmental impacts, renewable portfolio standards requirements, reliability requirements, customer-driven goals and interests, cost-effectiveness, and risk.